

# Procuring a User-Centered Voting System

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## Federal Election Commission

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# Introduction

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The Federal Election Commission's Office of Election Administration (OEA) assists state and local election officials by responding to inquiries, publishing research, and conducting workshops on all matters related to election administration. Additionally, the OEA answers questions from the public and briefs foreign delegations on the U.S. election process, including voter registration and voting statistics.

In 2002, the OEA launched an effort to ensure the usability and accessibility of voting systems. This initiative generated a comprehensive set of human factors standards for voting systems. It also produced the three guides listed below that facilitate the development, usability testing, and procurement of user-centered voting systems:

- Developing a User-Centered Voting System
- Usability Testing of Voting Systems
- Procuring a User-Centered Voting System

This guide, titled *Procuring a User-Centered Voting System*, is written for election officials who seek a voting system best suited to their constituents' needs and preferences. It provides a brief history on the current movement toward user-centered voting systems. It outlines the kind of process steps that voting system manufacturers should follow if they want to be assured of a user-friendly, accessible solution. Also, it provides a short checklist of user-friendly characteristics to look for in a good voting system – characteristics that may seem obvious but may become subordinated during the course of a complex and lengthy procurement effort unless they are spotlighted.

# About User-Centered Design

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The public is generally familiar with the terms ergonomic and user-friendly. The words describe products and systems that are a good match with the users' physical, intellectual, and emotional needs.

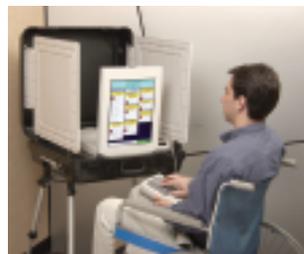
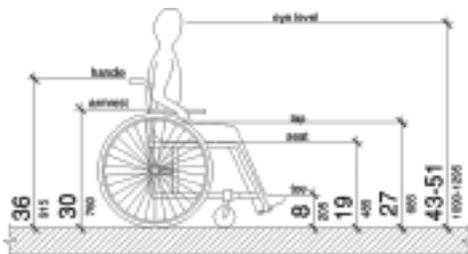
Consider a few examples. An ergonomic office chair should be comfortable to sit on for hours at a time. A well-designed kitchen appliance should be so easy to operate that there is no need for a user manual. A user-friendly personal computer application should accelerate the task of writing a report or paying bills. Applied to a voting system, the terms ergonomic and user-friendly suggest a user interface enabling voters to cast their ballot quickly and with high confidence that they are registering their votes accurately.

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The proven way to create an ergonomic or user-friendly product or system – particularly a voting system – is to follow a user-centered design (UCD) approach that makes meeting users' needs and preferences a priority (see ISO 13407, Human Centred Design Process for Interactive Systems).

The UCD approach is as much a philosophy as it is a set of developmental steps. To achieve good results, developers must be philosophically committed to building a product or system geared toward the tasks people will perform with it, rather than other technical considerations that are important but should not dictate the user interface design solution. Then, building a usable system will be a matter of follow through.

Adopting a UCD approach means including representative users in the process of determining system requirements and evaluating the evolving design at several stages. It means applying knowledge about human beings, such as anthropometric data that specifies their physical size, strength, and range of motion, as well as how people construct a mental picture of system functions, to create designs that fit the user like a glove.



Anthropometric data can be used to determine the proper height of a wheelchair accessible voting workstation.

Unfortunately, not all products and systems – including voting systems – are as ergonomic or user-friendly as they might be. Product and system shortcomings can often be traced to a technology-driven approach to design that tends to produce user interfaces that are too complex, making them hard to learn, slow to setup and operate, and error prone. Some designs fail to fully accommodate people who are particularly tall or short, or have impaired hearing or vision, for example. In contrast, there are many products and systems that seem to “get it right” from the users’ perspective, ensuring comfort while facilitating tasks. Many of these high-quality products and systems reflect a substantial investment in design, paying particular attention to human factors concerns.

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# The UCD Movement in Progress

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The difficulties that arose during the 2000 Presidential Election spotlighted the importance of good user interface design. In particular, the butterfly ballot was widely criticized as a potential source of voter error. The results from subsequent usability evaluations of ballots and other voting systems as a whole suggested that some, if not most of the voting systems in use today, could be enhanced in various ways to ensure their usability, thereby addressing accessibility concerns as well.

For starters, some of the voting systems used in the 2000 election were aging even before human factors engineering became an organized, professional discipline back in the mid-1900s. Consequently, many of the older systems exhibit human factors shortcomings that limit usability. That said, even some of the newest technologies, including direct recording equipment that require voters to interact with a computer user interface, depart from established design practices.

So, what has been done to improve the situation? Since 2000, the Federal Election Commission (FEC) has issued an updated set of Voting System Standards that includes a section on usability (see Section 12 Appendix C). At the same time, the Institute of Electrical and Electronics Engineers (IEEE) has proceeded to develop its own usability standards. Both organizations are about to (or have already) released standards that have much content in common and make large strides toward ensuring the usability and accessibility of voting systems.

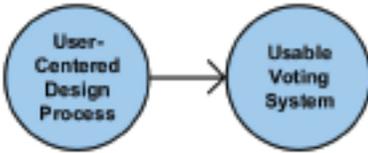
The events of 2000 and the latest guidance documents have already stimulated a number of voting system developers to adopt a more user-centered approach to design. Clearly, the vendors have come to view a strong commitment to meeting users' needs and preferences as a political and business imperative. The results should be a new generation of voting systems offering enhanced usability and accessibility.

Ultimately, every voting system placed into public use will require validation by a certified Independent Testing Authority (ITA). However, this will not resolve the question of which system to purchase. The purchase decision will be based on many factors, including usability. The balance of this guide promotes usability as a prime purchase criteria and offers advice on how to make good judgments about a voting system's user interface quality.

# Judging Design Process Quality

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There is a strong link between good design process and good user interface design.



Therefore, procurement officials should ask voting system vendors to describe their user interface design process in considerable detail.

Officials may ask vendors to present evidence that they:

- Conducted a robust program of user research as a precursor to defining system requirements and usability goals.
- Collected design feedback from appropriate samples of representative users, including voters and election officials. Users may have provided their feedback through various mechanisms, including participation in an iterative series of hands-on usability tests.
- Checked their design against current design guidelines and standards aimed at ensuring usability and accessibility.
- Set up a process to systematically track and address the usability problems they identified through usability tests and design audits.
- Made meaningful design changes to the voting system's user interface design in response to user feedback.
- Collected quantitative data on the capability of users to perform key tasks, such as transporting, setting up, and configuring the system, as well as creating ballots and casting votes, with ease and satisfaction.

Officials should be wary of the interactive qualities of voting systems developed in a less systematic manner.

# Judging User Interface Quality

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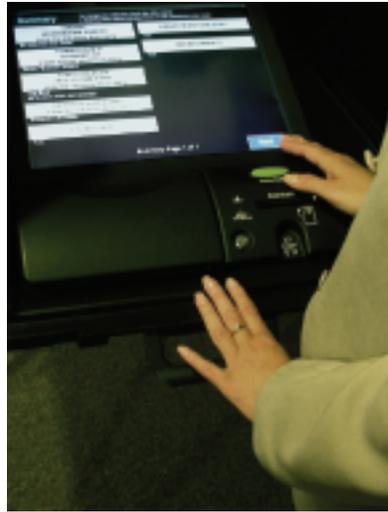
An ITA that is accredited by the National Association of State Election Directors will ensure that a voting system meets or exceeds the FEC's usability-related requirements. Otherwise, the system cannot be marketed.

However, ITA certification will not necessarily differentiate the usability of alternative voting systems in a way that permits direct comparisons. Therefore, procurement officials may want to conduct additional, detailed assessments of user interface quality during the vendor selection process. The possibilities include:

- Requiring potential vendors to conduct a user interface design audit of their system and submit the results along with their bids. Among other data, vendors should present evidence that they fully considered the requirements posed by a diverse user population.
- Engaging a usability specialist to conduct a comparative user interface design audit of the alternative systems, focusing on all portions of the voting system's user interface, including those used by voters, system administrators, and election officials.
- Engaging a usability specialist to conduct a comparative usability test of the alternative systems (see the companion guide titled Usability Testing of Voting Systems).

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Each one of these steps will help differentiate the usability of the alternative voting systems in an objective, quantitative manner, although usability testing is arguably the most stringent assessment technique. Such assessments may be more complicated if the preferred vendor will be developing a highly customized voting system once they receive the contract award. In such cases, procurement officials may have to settle for evaluating a similar system.



Usability tests may be focused on a wide range of user tasks, such as equipment setup, voting (including the use of adaptive technologies), and vote counting.

# Important Design Characteristics

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General ways to enhance the usability of voting systems include:

- Providing mechanisms to adjust the system workstations to suit users with diverse physical characteristics and capabilities.
- Providing a clear, unambiguous means to cast a vote for a specific candidate or referendum question, for example.
- Allowing voters to review and change their votes before submitting a completed ballot.
- Presenting all information and options in a logical order that is easy to follow.
- Clearly identifying the start and end points of a given task.
- Guiding users through all processes.
- Helping users identify and recover from errors quickly and confidently.
- Excluding extraneous information and features.

More specific ways to enhance the usability of voting systems include:

- Using simple, easy to read letter styles (usually sans serif fonts).
- Using color and other coding methods (e.g., size, shape, flashing, etc.) in a conservative fashion to draw attention to the most important information.
- Providing a relatively large proportion of blank space on control panels and computer screens, for example, to limit visual congestion and make the user interface look less intimidating.
- Delivering feedback (e.g., tactile, visual, and/or audible) in response to every user input, such as pressing a button.
- Providing clear, simply stated prompts that avoid jargon.
- Including confirmation steps to ensure that the user is ready to take irreversible steps, such as casting his or her ballot.
- Implementing a design aesthetic that conveys professionalism, thereby building user confidence in and satisfaction with the voting system.

# Potential Benefits and Costs

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Usability should be a high priority in any voting system procurement effort. A particularly usable voting system provides the following benefits:

- Simpler system setup and configuration.
- Simpler ballot design.
- Reduced need for voter assistance.
- Increased voter throughput.
- Increased voter comfort and satisfaction.
- Reduced chance of voter error.
- Reduced chance of vote counting error.
- Better accommodation of people with special needs.
- Improved public opinion.

Of course, there are costs to be considered. Procurement officials must invest the time to conduct usability analyses, such as a design audit or usability test. Sometimes, in-house staff with the proper knowledge and experience can handle the usability analyses. Or, it may be necessary to outsource the analytical support to usability consultants. Clearly, either type of effort would require an investment.

Regardless of who leads the usability analyses, there should almost surely be a strong return on investment, which may be measured both in monetary and non-monetary terms over several years.

Of course, avoiding serious problems during an election is invaluable.

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